

## \* NOTICES \*

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## DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention relates to the tape connector for electronic parts connection which mounts electronic parts, such as LSI and a liquid crystal display unit, on a substrate.

[0002]

[Description of the Prior Art] There is the method of using a tape connector as a method of mounting electronic parts, such as LSI and a liquid crystal display unit, on a substrate. Drawing 4 shows a mounting conceptual diagram. In drawing, 1 is the circuit board and LSI10 and the liquid crystal display unit (LCD) 4 are mounted on this. Drawing 5 shows some cross sections of X-X' of drawing 1. Drawing 6 is the fragmentary sectional view of the anisotropy electric conduction tape connector used in this case. the circuit board 1 called it a polyimide, glass epoxy, and polyester -- comparatively -- the shape of sheet metal -- FURESHI -- it consists of a base material 2 with a kibble property, and a conductor 3 formed in the shape of a circuit pattern on this at copper foil by metallic foils, such as tinning or a thing which carried out nickel-Au plating, and aluminum foil LCD4 is equipped with the conductor 6 which formed the vacuum evaporation thin films (ITO etc.) of an indium or tin in the glass base material 5 in the shape of a circuit. The anisotropy electric conduction tape connector 7 is between the circuit board 1 and LCD4, and this anisotropy electric conduction tape connector 7 carries out optimum dose mixture distribution of the conductive filler 9 which consists of a plastics polymer particle object which gave metal plating on metal powders and plastics particle front faces, such as nickel metallurgy, into the adhesives 8 of a hot-melt system, and is constituted. This anisotropy electric conduction tape connector 7 has conductivity only in the direction which says from the connection principle and connects a circuit and a circuit, and connection processing of other adjoining circuits must be carried out so that insulation may be maintained. However, like colorization (in order to pull out the signal of three colors called R-G-B, the number of signals increases by 3 times by simple calculation) of a display, and liquid crystal TV, for the precision of the display screen, and enlargement, a liquid crystal display signal is put more in order by the minute pitch, and the number is also increasing. Then, it is the short-circuit between contiguity terminals which is easy to pose a problem after connection processing. The state of this faulty connection is shown in drawing 7. That is, since the path of the conductive filler which should play the role which connects up-and-down circuits is large, the danger of flowing also through the adjoining circuit through which it originally must not flow

accidentally will increase. The conductive filler 9 of the anisotropy electric conduction tape connector which connects the circuit is also arranged with a finer particle as the interval of the width of face and the circuit of the circuit which should generally be connected, and a circuit becomes narrow as a means to avoid this problem (it cannot use, if it generally remains as it is in order that the surface ratio seen from the flat surface may increase, when a filler is made fine.). (as a connection pitch becomes minute) Therefore, the thing for which it is necessary to also reduce content simultaneously and which is moreover made to distribute uniformly becomes important. The cross section of the anisotropy electric conduction tape carried out in this way is shown in drawing 8 .

[0003]

[Problem(s) to be Solved by the Invention] However, if connection processing tends to be carried out using the above-mentioned anisotropy electric conduction tape connector, the need of processing it so that the conductive filler to which the circuits of the vertical direction were made approaching more, and the anisotropy tape became finer may connect mutual circuits will come out. The state after processing at this time (after connection) is shown in drawing 9 . That is, if thickness of the anisotropy tape before processing is set to 20 micrometers, the particle diameter of the conductive filler contained in it is set to 5 micrometers and an anisotropy tape will not be compressed from 20 micrometers to 5 micrometers after processing, connection of normal circuits cannot be obtained. In this case, although what is necessary will be just to raise the welding pressure at the time of processing simply, a limitation comes out according to the limitation of pressure-proofing of a glass material, or the precision of a pressurizer of LCD etc. to raise welding pressure. For this reason, the design used as material which is easy to have the material of the anisotropy tape itself compressed is needed. How to make it into the material which is generally easy to flow when the hot-melt system adhesives of an anisotropy tape are pressurized and heated can be considered. For example, since this pressurization and the heating fluidity are high compared with thermoplastic adhesives [ thermosetting adhesives /, such as an epoxy resin, ], such as polyester, urethane, and rubber, an epoxy resin is chosen as a material which is easy to flow. Although it will become that the adhesives base flows out at the time of processing (pressurization, heating), and it is easy to be compressed at it if the anisotropy tape connector of such material physical properties is used, when the adhesives base flows, a conductive filler will also flow out simultaneously. Consequently, a conductive filler is no longer distributed uniformly, the secondary partial meeting (secondary condensation) is caused, and the problem which causes the short-circuit between contiguity terminals as a result comes out. Moreover, although making thickness of the first anisotropy tape thin beforehand is also considered in order to avoid this problem, there is a problem which a crevice is generated without fully filling up the crevice between circuits with adhesives after connecting circuits, and produces another evil in which the adhesion fixed force declines and the reliability for a connection falls.

[0004] the purpose of this invention avoids the short-circuit between the terminals which adjoin even if the circuit pitch of an adherend is small in view of the trouble of the above-mentioned conventional technology, and offers the tape connector which can moreover secure sufficient adhesive strength -- it is in things

[0005]

[Means for Solving the Problem] this invention comes to prepare the insulating TEBU layer to which a fluidity contains the insulating filler of a minor diameter rather than the

aforementioned conductive filler in high hot-melt system adhesives to the aforementioned hot-melt system adhesives on the anisotropy electric conduction tape layer containing a conductive filler into hot-melt system adhesives.

[0006]

[Function] If the tape connector of the above-mentioned composition is set and heated [ pressurize and ] between an adherend and the circuit board when the electronic parts which are adherends are mounted on the circuit board, relatively, the conductive filler of an anisotropy electric conduction tape layer will come to be located between the circuits of outflow, electronic parts, and a substrate by the insulating-tape layer with a high fluidity at a longitudinal direction, and connection between those circuits will be made. In this case, in order that an anisotropy electric conduction tape layer may not flow into a longitudinal direction at the time of processing (pressurization, heating), secondary condensation of a conductive filler can be prevented, and the short-circuit between lateral circuits is prevented. That is, while the uniform distributed state of a conductive filler had been maintained, connection between circuits is made. On the other hand, the crevice between lateral circuits will fully be filled up with adhesives, and an insulating-tape layer becomes what also has the enough adhesion fixed force, in order to flow into a longitudinal direction at the time of processing.

[0007]

[Example] Drawing 1 shows the cross section of the tape connector of the example of this invention. As shown in drawing, this tape connector for electronic-parts connection consists of the two-layer structure, forms the insulating-tape layer 14 containing an insulating filler on the anisotropy electric conduction tape layer 12 containing a conductive filler, and is constituted. As compared with the insulating filler 15 which contains the conductive filler 13 contained in the anisotropy electric conduction tape layer 12 in the insulating-tape layer 14, the particle diameter is set up about 3 to 5 times. Specifically, the thickness of the whole tape connector 11 is set as 20 micrometers, the thickness of the anisotropy electric conduction tape layer 12 is set as 10 micrometers, the system of the conductive filler 13 is set as 5 micrometers - 10 micrometers, and the system of the insulating filler 15 is set as 1-3 micrometers. There are many amounts which the insulating filler 15 distributes compared with the amount of the conductive filler 13. Moreover, although both the electric conduction tape layer 12 and the insulating-tape layer 14 consist of epoxy system resin adhesives, it is adjusted by the well-known method so that the fluidity of the insulating-tape layer 14 may become high as compared with it of the electric conduction tape layer 12.

[0008] The state when mounting LCD4 on a substrate using the tape connector 11 of the above-mentioned composition is shown in drawing 2, and the state when mounting LSI chip 21 is shown in drawing 3. In any case, a tape connector is carried on a substrate, and it pastes it up by performing alignment of the adherend of LCD4 or LSI chip 21, and performing pressurization and heating.

[0009] In the example shown in drawing 2, in the circuit side which outflow and pressurization concentrate [ the fluid high insulating-tape layer 14 ] on a longitudinal direction at the time of processing, the conductive filler 13 breaks the insulating-tape layer 14, and connects circuits certainly. On the other hand, between the circuits of the longitudinal direction which pressurization does not require, since the insulating filler 15 is held, the short-circuit between contiguity terminals is prevented. And the layer of adhesives comes out enough, it fills up that there is no crevice for a certain reason, and a bond

strength is also fully held between them.

[0010] Moreover, at the time of processing, in respect of the circuit which pressurization concentrates (the circuit 23 of LSI chip 21, and circuit 3 of a substrate), the conductive filler 13 breaks through the insulating-tape layer 14, and connection is held in the example shown in drawing 3 which mounted LSI chip 21. On the other hand, between the portions 3 which pressurization does not require, i.e., a circuit, adhesives can hold intensity fully sufficient for a certain reason. Moreover, by this example, since insulating processing of the edge section 22a of the edge of the LSI base 22 is not carried out in the case of the LSI chip, although it is necessary to make it short-circuit not arise between this edge section 22a and the circuit 3 which counters it, since the layer which the insulating filler 15 contained in the meantime is held, this LSI edge short-circuit can be prevented.

[0011]

[Effect of the Invention] Connection between circuits can be made holding the uniform distributed state of the conductive filler in an anisotropy electric conduction tape layer, when an insulating-tape layer flows more as compared with an anisotropy electric conduction tape at the time of pressurization and heating. That is, the short-circuit between circuits does not arise.

[0012] Moreover, since there is a fluidity, the welding pressure of an insulating-layer tape may also be small. Moreover, since the adhesives containing the insulating filler which flowed in the longitudinal direction at the time of processing will be filled up between lateral circuits, sufficient adhesive strength can be held in this portion.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The block diagram of the example of this invention is shown.

[Drawing 2] The cross section of the connection at the time of using the tape connector of the example of this invention for LCD mounting is shown.

[Drawing 3] The cross section of the connection at the time of using the tape connector of the example of this invention for LSI chip mounting is shown.

[Drawing 4] Drawing showing the mounting conceptual diagram when mounting LSI and LCD in the circuit board

[Drawing 5] Drawing showing the cross section of the connection at the time of performing LCD mounting using the conventional tape connector

[Drawing 6] Drawing showing structural drawing of the conventional tape connector

[Drawing 7] Drawing showing the cross section of the connection at the time of performing LCD mounting to the substrate which has a circuit pattern in a minute pitch using the conventional tape connector

[Drawing 8] Drawing showing the structure of the improved conventional tape connector

[Drawing 9] Drawing showing the cross section of the connection at the time of performing LCD mounting using the conventional tape connector by which improvement was carried out [ above-mentioned ]

[Description of Notations]

11-tape connector

12-anisotropy electric conduction tape layer

13-conductivity filler

14-insulating-tape layer

15-insulation filler

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CLAIMS

[Claim(s)]

[Claim 1] The tape connector for electronic-parts connection which comes to prepare the insulating TEBU layer to which a fluidity contains the insulating filler of a minor diameter rather than the aforementioned conductive filler in high hot-melt system adhesives to the aforementioned hot-melt system adhesives on the anisotropy electric conduction tape layer containing a conductive filler into hot-melt system adhesives.

[Translation done.]

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TITLE: Electronic part e.g. LSI chip or  
LCD, tape connector - retains sufficient connection force  
and prevents short between circuits in case of accurate  
pitch circuit pattern connected to covered body, by  
setting insulation layer NoAbstract

PATENT-ASSIGNEE: SHARP KK[SHAF]

PRIORITY-DATA: 1991JP-0164482 (July 4, 1991)

PATENT-FAMILY:

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ABSTRACTED-PUB-NO: JP 05013119A

EQUIVALENT-ABSTRACTS:

CHOSEN-DRAWING: Dwg.1/9

TITLE-TERMS: ELECTRONIC PART LSI CHIP LCD TAPE CONNECT  
RETAIN SUFFICIENT

CONNECT FORCE PREVENT SHORT CIRCUIT CASE  
ACCURACY PITCH CIRCUIT  
PATTERN CONNECT COVER BODY SET INSULATE LAYER  
NOABSTRACT

DERWENT-CLASS: U11 U14 V04

EPI-CODES: U11-D03A9; U11-E01X; U14-K01A4; V04-B01; V04-C;  
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ABSTRACT:

PURPOSE: To prevent the short between circuits in the case of connecting an adherend to a circuit pattern of fine pitch, and hold a sufficient adhesion.

CONSTITUTION: An insulating tape layer 14 having an insulating filler 15 smaller in diameter than a conductive filler 13 contained in a hot melt adhesive having relatively high flowability is provided on an anisotropic conductive tape layer 12 having the conductive filler 13 contained in a hot melt.

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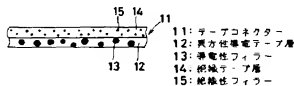
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(54)【発明の名称】 電子部品接続用テープコネクタ

(57)【要約】

【目的】 絡細ピッチの回路パターンに対して被着体を接続する場合に回路間のショートを防ぎ、且つ十分な接着力を保持する。

【構成】 ホットメルト系接着剤中に導電性フィラー13を含有する異方性導電テープ層12の上に、流動性が相対的に高いホットメルト系接着剤中に前記導電性フィラー13よりも小径の絶縁性フィラー15を含有する絶縁テープ層14を設ける。



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## 【特許請求の範囲】

【請求項1】 ホットメルト系接着剤中に導電性フィラーを含有する異方性導電テープ層の上に、前記ホットメルト系接着剤に対して流動性が高いホットメルト系接着剤中に前記導電性フィラーよりも小径の絶縁性フィラーを含有する絶縁テープ層を設けてなる、電子部品接続用テープコネクタ。

## 【発明の詳細な説明】

【0001】

【産業上の利用分野】 本発明は、LSI、液晶表示ユニット等の電子部品を基板上に実装する電子部品接続用テープコネクタに関する。

【0002】

【従来の技術】 LSI、液晶表示ユニット等の電子部品を基板上に実装する方法として、テープコネクタを使用する方法がある。図4は、実装概念図を示す。図において、1は回路基板であり、この上にLSI10と液晶表示ユニット(LCD)4が実装される。図5は、図1のX-X'の断面図の一部を示す。図6はこの際に見える異方性導電テープコネクタの部分断面図である。回路基板1は、ポリイミドやガラスエポキシ、ポリエステルといった比較的薄板状でフレキシブルな特性を持つベース材2と、この上に、銅箔にスズメッキあるいはNi-Auメッキしたのやアルミ箔等の金属箔で回路パターン状に形成された導体3とで構成されている。LCD4は、ガラス基材5にインジウムオキシドの蒸着薄膜(ITO等)を回路状に形成した導体6を備えている。

回路基板1とLCD4との間には異方性導電テープコネクタ7があり、この異方性導電テープコネクタ7は、ホットメルト系の接着剤8の中にニッケルや金等の金属粉末やプラスチック粒子表面に金属メッキを施したプラスチックポリマー粒子からなる導電性フィラー9を適量混合分散させて構成されている。この異方性導電テープコネクタ7は、その接続原理から見て回路と回路とを接続する方向にのみ導電性を持ち、隣接する他の回路とは絶縁性を保つように接続加工されなければならない。しかし、表示のカラー化(R・G・Bといった三色の信号を引き出すために信号数は単純計算で三倍に増加する)や、液晶TVのように表示画面の密塞と大型化のために液晶表示信号はより精細ピッチに並べられ、その数も増加の傾向にある。そこで、接続加工後に問題となってしまうのが隣接端子間のショートである。この接続不良の状態を図7に示す。すなわち、上下の回路同士を接続する役割を果たすべき導電性フィラーの径が大きいために、本来導通してはならない隣接回路をも誤って導通してしまう危険性が増してくることになる。この問題を回避する手段として、一般には接続すべき回路の幅とその回路と回路の間隔が狭くなるに従い(接続ピッチが精細になるに従い)、その間隔を接続する異方性導電テープコネクタの導電性フィラー9よりも細かい微粒子に揃

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え(一般には、フィラーを細かくすると平面上から見た面積比が増えるために、そのままで使えない)。したがって、含有率も同時に減らすことが必要になる)。しかも、均一に分散させることが重要になる。このようにした異方性導電テープの部分断面を図8に示す。

【0003】

【発明が解決しようとする課題】 ところが、上記の異方性導電テープコネクタを使って接続加工せよとすると、上下方向の回路同士をより近接させて異方性テープのより細くなった導電性フィラーが互いの回路同士を接続するように加工する必要がある。この時の加工後(接続後)の状態を図9に示す。すなわち、加工前の異方性テープの厚さを20 $\mu$ mとし、その中に含まれる導電性フィラーの粒子径を5 $\mu$ mとすると、加工後には20 $\mu$ mから5 $\mu$ mまで異方性テープを圧縮しなければ正常な回路同士の接続を得ることができない。この場合、加工時の加圧力を単純に上げればよいことになるが、LCDといったガラス素材の耐圧や加圧装置の精度の限界等によって、加圧力を上げるには限界が出てくる。このため、異方性テープ自体の素材をより細くされやすい材料にする設計が必要になってくる。一般的には、異方性テープのホットメルト系接着剤を加圧、加熱した時に流動しやすい材料にする方法が考えられる。たとえば、エポキシ樹脂等の熱硬化性接着剤はポリエステルやウレタン、ゴムといった熱可塑性接着剤に比べてこの加圧、加熱流動性が高いために、流動しやすい材料としてエポキシ樹脂が選ばれる。このような材料物性の異方性テープコネクタを使うと加工時(加圧、加熱)に接着剤ベースが流れ出して圧縮されやすくなるが、接着剤ベースが流れる時に同時に導電性フィラーも流れ出してしまふことになる。この結果、導電性フィラーが均一に分散されなくなり二次的な偏った集まり(二次凝集)を生じ起こし、結果的に隣接端子間のショートを抱いてしまう問題が出る。また、この問題を回避するために最初の異方性テープの厚さを予め薄くしておくことも考えられるが、回路同士を接続した後に回路と回路の間隔の凹部に接着剤が十分に充填されず隙間に隙間が生じてしまい、接着剤固定力が低下し接続部分の信頼性が低下するという別の弊害を生じてしまう問題がある。

【0004】 本発明の目的は、上述の従来技術の問題点に鑑み、被着体の回路ピッチが小さくても隣接する端子間のショートを回避し、しかも十分な接着力を確保できるテープコネクタを提供することにある。

【0005】

【課題を解決するための手段】 本発明は、ホットメルト系接着剤中に導電性フィラーを含有する異方性導電テープ層の上に、前記ホットメルト系接着剤に対して流動性が高いホットメルト系接着剤中に前記導電性フィラーよりも小径の絶縁性フィラーを含有する絶縁テープ層を設けてなるものである。

【0006】

【作用】被着体である電子部品を回路基板上に実装する時に上記の構成のテープコネクタを被着体と回路基板間において加圧、加熱すると、相対的に流動性が高い絶縁テープ層が横方向に流れ出し、電子部品と基板の回路間に異方性導電テープ層の導電性フィラーが位置するようになってそれらの回路間の接続が行われる。この場合、加工時（加圧、加熱）に異方性導電テープ層が横方向に流れださないために導電性フィラーの二次凝集を防ぐことができ、横方向の回路間のショートが防止される。すなわち、導電性フィラーの均一な分散状態が保たれたまま回路間の接続が行われる。一方、絶縁テープ層は加工時に横方向に流れだすために横方向の回路間の凹部に接着剤が十分に充填されることになって接着固定力も十分なものとなる。

【0007】

【実施例】図1は本発明の実施例のテープコネクタの断面図を示す。図に示すように、この電子部品接続用テープコネクタは、二層構造からなり、導電性フィラーを含む異方性導電テープ層12の上に、絶縁性フィラーを含む絶縁テープ層14を設けて構成されている。異方性導電テープ層12内に含有される導電性フィラー13は絶縁テープ層14内に含有される絶縁性フィラー15に比較して粒子径が約3〜5倍に設定されている。具体的に、テープコネクタ11の全体の厚さを20 $\mu\text{m}$ に設定し、異方性導電テープ層12の厚さを10 $\mu\text{m}$ に設定し、導電性フィラー13の系を5 $\mu\text{m}$ 〜10 $\mu\text{m}$ に設定し、絶縁性フィラー15の系を1〜3 $\mu\text{m}$ に設定する。絶縁性フィラー15の分散する量は導電性フィラー13の量に比べて多い。また、導電テープ層12と絶縁テープ層14は共にエポキシ系樹脂接着剤で構成されるが、絶縁テープ層14の流動性が導電テープ層12のそれに比較して高くなるように公知の方法で調整される。

【0008】上記の構成のテープコネクタ11を使用して基板上にLCD4を実装した時の状態を図2に示し、LSIチップ21を実装した時の状態を図3に示す。いずれの場合も、基板上にテープコネクタを載せ、LCD4またはLSIチップ21の被着体の位置合わせを行って加圧、加熱を行うことによって接着する。

【0009】図2に示す例では、加工時に流動性の高い絶縁テープ層14が横方向に流れ出し、加圧が集中する回路間において導電性フィラー13が絶縁テープ層14を破って回路同士を確実に接続する。一方、加圧のかからない横方向の回路間では絶縁性フィラー15が保持されるために、隣接端子間のショートが防がれる。しかも、この間では接着剤の層が十分であるために隙間なく充填され接着強度も十分に保持される。

【0010】また、LSIチップ21を実装した図3に

示す例では、加工時に、加圧が集中する回路間（LSIチップ21の回路23と基板の回路3）では、導電性フィラー13が絶縁テープ層14を突き破って接続が保持される。一方、加圧のかからない部分では、すなわち、回路3の間では接着剤が十分にあるために十分な強度を保持できる。また、LSIチップの場合LSIベース22の端部のエッジ部22aが絶縁処理されていないために、このエッジ部22aとそれに対向する回路3との間でショートが生じないようにする必要があるが、本実施例ではこの間に絶縁性フィラー15の含有された層が保持されるためにこのLSIエッジ部を防止することができる。

【0011】

【発明の効果】加圧、加熱時に絶縁テープ層が異方性導電テープに比較してより流動することによって異方性導電テープ層内の導電性フィラーの均一な分散状態を保持したまま回路間の接続を行うことができる。すなわち、回路間のショートが生じない。

【0012】また、絶縁テープは流動性があるために加圧力も小さくしてよい。また、加工時に横方向に流動した絶縁性フィラーを含む接着剤が横方向の回路間に充填することになるためこの部分において十分な接着力を保持できる。

【図面の簡単な説明】

【図1】本発明の実施例の構成図を示す。

【図2】本発明の実施例のテープコネクタをLCD4実装に使用した場合の接続部の断面図を示す。

【図3】本発明の実施例のテープコネクタをLSIチップ実装に使用した場合の接続部の断面図を示す。

【図4】LSI及びLCDを回路基板上に実装する時の実装概念図を示す図

【図5】従来のテープコネクタを使用してLCD実装を行った場合の接続部の断面図を示す図

【図6】従来のテープコネクタの構造図を示す図

【図7】回路パターンが精密ピッチにある基板に対して従来のテープコネクタを使用してLCD実装を行った場合の接続部の断面図を示す図

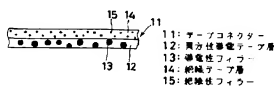
【図8】改良された従来のテープコネクタの構造図を示す図

【図9】上記改良された従来のテープコネクタを使用してLCD実装を行った場合の接続部の断面図を示す図

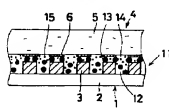
【符号の説明】

- 11 テープコネクタ
- 12 異方性導電テープ層
- 13 導電性フィラー
- 14 絶縁テープ層
- 15 絶縁性フィラー

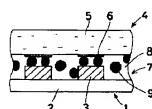
【図1】



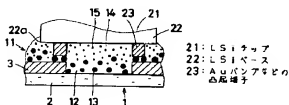
【図2】



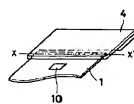
【図3】



【図4】

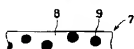


【図5】

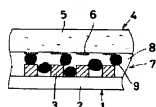


1: 回路基板  
4: LCD  
10: LSI

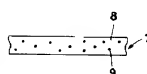
【図6】



【図7】



【図8】



【図9】

